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BRIEFING
INFORMATION CONCERNING
PROJECT AQUATONE

This paper is intended for use as an amplification when short, oral briefings have been necessary, in order to introduce an individual more intimately to AQUATONE.

HISTORICAL BACKGROUND

Aerial Cameras

In World War II, as the range of enemy anti-aircraft fire was gradually extended upwards, Allied plans on photographic missions had to fly at continually higher altitudes. Optical scientists in this country were forced to evolve cameras which would take more detailed pictures at faster speeds and from much greater height.

The bulk of the development work sponsored by the National Defense Research Committee (NDRC) on new and special types of aerial camera lenses and lens systems was carried out at Harvard University under the technical direction of Dr. James G. Baker. The program began originally early in 1941 as a contract job for the Photographic Laboratory of the Army Air Forces at Wright Field, and was taken over by NDRC during the following year at the request of the Air Forces.

Foremost among the new cameras designed at Harvard was a 40-inch f. 5.0 automatic telephoto camera which gave a high order of definition. In pictures taken with the camera from 10,000 feet, it was possible to distinguish telephone wires, power cables, and their shadows. From 30,000 feet, even such minute details as railroad ties could be spotted.

The Harvard optical staff also worked on both 36-inch and 100-inch camera systems. One of the 36-inch systems was needed as a substitute for the standard 24-inch lens in the K-18 camera. Service testing in late 1944 at 15,000 and 20,000 feet proved that it was a satisfactory and practical replacement for the smaller lens system. The 100-inch anastigmatic lens system for high-altitude photography was a long-range project which had some success. A working model was built, but because of lack of homogeneity in the optical glass the expected telescopic quality did not materialize, and the camera was recommended for use only at altitudes of approximately 50,000 feet.

Other lens systems developed at Harvard included special 7-inch f. 2.5 lenses for night photography, spherically symmetrical lenses for wide-angle photography, and 36- and 48-inch lenses incorporating artificial fluorite. The spherically symmetrical lenses were designed to allow one camera to do the work of three, since three short-focus cameras were usually mounted together and synchronized to obtain wide-angle coverage on a photographic mission.

Aircraft

Human rocketry began in World War II with the Messerchmitt 163 interceptor fighter, which could travel from ground to 40,000 feet in about three minutes. Leveling off at a top speed of 600 mph, it could fly a total of 11 minutes, reaching 50,000 feet.

Major Charles Yeager, USAF, made the world's first supersonic flight in the Bell X-1 rocket-driven research single-seat aircraft on October 14, 1947. His airplane was lifted from the ground into the open bomb-bay of a Boeing B-29 superfortress. At 30,000 feet, the bomber released the bell.

Bill Bridgeman, test pilot for Douglas Aircraft Company, flew at 1,238 mph reaching 79,494 feet in the Skyrocket in August 1951. Bridgeman traveled in the B-29 while it climbed to 35,000 feet where it dropped him into space. The motor burned a ton of fuel per minute. Temperature was 270° Fahrenheit. The Skyrocket's gliding speed was 275 mph; it came down for a landing at 250 mph, and landed at 180 mph.

Lieutenant Colonel Marion E. Carl, USMC, was released in a Skyrocket at 35,000 feet on 21 August 1953. He climed to 75,000 feet where his fuel burned out. Carl climbed to 83,285 feet without any power but his own speed. It took him ten minutes to reach the ground.

Yeager beat Bridgeman's speed in December 1953 flying 1,650 mph in the Bell X-1A.

In 1954, Major Arthur Murray, USAF, reached the greatest height then attained by man, flying the X-1A up to approximately 90,000 feet after his release from a B-29 at 30,000 feet.

These rocket research aircraft weigh about 16,000 pounds at release, carrying 6,000 pounds in fuel which is consumed in 4 minutes. The cockpit is highly pressurized for, at 60,000 feet the atmospheric pressure falls to about one-tenth of that at sea level.

Maximum flight height for a jet engine is between 60,000 and 70,000 feet. A ramjet may operate up to about 90,000 feet. About that height rocket propulsion is essential because no power unit can any longer obtain enough oxygen from the tenuous atmosphere.

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IMMUNIZATION REQUIREMENTS

Certain immunizations are required for a world-wide standby; these are typhoid, cholera, tetanus, typhus, yellow fever, smallpox, and diphtheria. These immunizations are given as follows:

Typhoid	- requires three (3) injections from seven (7) to twenty-eight (28) days apart.
Cholera	- requires two (2) injections, seven (7) to ten (10) days apart.
Tetanus	- requires two (2) injections, twenty-eight (28) to forty-two (42) days apart.
Typhus	- requires two (2) injections, seven (7) to ten (10) days apart.
Yellow Fever	- is given in one (1) injection; not to be given within five (5) days of the time typhoid or smallpox is given.
Smallpox	- requires one (1) injection.
Diphtheria	- requires three (3) injections, twenty-eight (28) to forty-two (42) days apart, if the Schick test indicates the injection is necessary.

If the subject has received the following immunizations within the stated periods, booster shots only will be necessary as follows:

Typhoid	- each year except for Pacific area which is six months.
Cholera	- every six months regardless of area.
Tetanus	- each year except for Pacific area which is six months.
Typhus	- each year except for Pacific area which is six months.

If the subject has received the following immunizations within the stated periods, no repeat immunization will be necessary:

Yellow Fever	- Every four (4) years.
Smallpox	- every year except for Pacific area which is six months.

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